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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/512,497	02/24/2000	Daniel M. Kinzer	IR-1649(2-1939)	5663

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EXAMINER
SEFER, AHMED N

ART UNIT	PAPER NUMBER
2826	

DATE MAILED: 04/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/512,497	Applicant(s) KINZER ET AL.	
	Examiner A. Sefer	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 January 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) *21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 12-20 are rejected under 35 U.S.C. 102(a) as being anticipated by Calafut (JP 11-284174).

Calafut discloses in fig. 4 Mosgated device comprising a semiconductor substrate of N+ conductivity and having an upper surface; at least first and second invertible vertical channel forming trenches 41 formed through said upper surface and into said substrate for a first depth; a gate oxide 43 coating the interior walls of said at least first and second trenches; channel region of P conductivity disposed adjacent to a portion of the length of the walls of said first and second trenches and to a second depth below said upper surface, said second depth being less than said first depth; a shallow source which extends from said upper surface and into said substrate for a third depth; said third depth being less than said second depth; first and second polysilicon layers filling said at least first and second trenches respectively and which are insulated from said substrate; a plurality of narrow, spaced conductive gate strips 45 disposed atop an insulation gate layer 43 and extending across and contacting conductive bodies 46.

As to claim 13, Calafut discloses a source contact 53 which is fully laterally spaced from an area of an upper surface which is between first and second trenches 41 and connected to a source region 50 at a location remote from first and second trenches.

As to claims 14 and 20, Calafut discloses a source contact connected to a channel region 49 at said remote location.

As to claims 15-19, the specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baba et al. US Patent No. 5,321,289 in view of Calafut (JP 11-284174).

Baba et al disclose in fig. 1B a Mosgated device comprising a semiconductor substrate 10 of N+ conductivity and having an upper planar surface; a channel diffusion region 12 of P conductivity which extends into said upper planar surface of said substrate and to a first depth below said surface; a source diffusion 13 of N+ conductivity which extends into said substrate to a second depth which is less than the first depth; a plurality of spaced trenches 14 formed into said substrate and into its said planar surface to a third depth below said substrate surface which is greater than said first depth; an insulation gate layer 15 formed on the walls of

said plurality of trenches at least in the areas between said first and second depths; conductive gate bodies disposed within the interiors of each of said trenches; a source contact S connected to said source diffusion region at a location on said upper planar surface which is completely laterally removed from said plurality of trenches; a drain contact D connected to said substrate.

Calafut discloses in fig. 4 a plurality of narrow, spaced conductive gate strips 45 disposed atop an insulation gate layer 43 and extending across and contacting conductive bodies 46.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate Kim's teachings with Baba et al, since that would prevent a snapback.

As for claim 2, Baba et al disclose in fig. 1A a plurality of spaced trenches which are parallel to one another and are coextensive with one another.

As for claim 3, Baba et al disclose in fig. 1A a plurality of spaced trenches formed in a plurality of spaced rows and are parallel to one another and are coextensive with one another within each row.

As to claim 10, Baba el disclose (see col. 2, lines 35-39) an oxide gate insulation layer fully covering the interior of each said trenches and wherein each said conductive bodies is polysilicon which completely fills each of said trench and is insulated from said substrate, but does not specifically disclose a thickness range of the insulation layer. However, it would have been obvious to use a thickness range of about 200 Å, since the described limitation would have been considered an optimization or workable range involving a routine skill in the art.

As to claim 11, Baba et al disclose in fig. 1B a source contact connected to a channel region and to a source region.

As to claims 4-9, the specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

5. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Calafut (JP 11-284174) in view of Bulat et al. US Patent No. 5,106,770.

Calafut discloses in fig. 4 a Mosgated device comprising a semiconductor substrate of N+ conductivity and having an upper planar surface; a channel diffusion region of P conductivity which extends into said upper planar surface of said substrate and to a first depth below said surface; a source diffusion of N+ conductivity which extends into said substrate to a second depth which is less than the first depth; a plurality of spaced trenches 41 formed into said substrate and into its said planar surface to a third depth below said substrate surface which is greater than said first depth; an insulation gate layer 43 formed on the walls of said plurality of trenches at least in the areas between said first and second depths; conductive gate bodies disposed within the interiors of each of said trenches; a source contact 53 connected to said source diffusion region at a location on said upper planar surface which is completely laterally removed from said plurality of trenches; a plurality of narrow, spaced conductive gate strips 45 disposed atop an insulation gate layer 43 and extending across and contacting conductive bodies 46, but does not disclose a drain contact.

Bulat et al disclose a drain contact 32 connected to a substrate.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to employ a drain contact, since that would facilitate a connection to other devices.

As for claim 2, Calafut discloses a plurality of spaced trenches which are parallel to one another and are coextensive with one another.

As for claim 3, Calafut discloses a plurality of spaced trenches formed in a plurality of spaced rows and are parallel to one another and are coextensive with one another within each row.

As to claim 10, Calafut discloses an oxide gate insulation layer fully covering the interior of each said trenches and wherein each said conductive bodies is polysilicon which completely fills each of said trench and is insulated from said substrate, but does not specifically disclose a thickness range of the insulation layer. However, it would have been obvious to use a thickness range of about 200 Å, since the described limitation would have been considered an optimization or workable range involving a routine skill in the art.

As to claim 11, Calafut discloses a source contact connected to a channel region and to a source region.

As to claims 4-9, the specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Response to Arguments

Applicant's arguments with respect to claims 1-20 have been considered but are not persuasive.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Sefer whose telephone number is (703) 605-1227.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601.

ANS
April 7, 2003